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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/686,508	10/14/2003	Gregory A. Hubbard	GP-304193	3535
7590	12/19/2005		EXAMINER	
Leslie Hodges General Motors Corporation, Legal Staff Mail Code: 482-C23-B21 P.O. Box 300 Detroit, MI 48265-3000			ARTHUR JEANGLAUDE, GERTRUDE	
			ART UNIT	PAPER NUMBER
			3661	

DATE MAILED: 12/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/686,508

Applicant(s)

HUBBARD ET AL.

Examiner

Gertrude Arthur-Jeanglaude

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 01 December 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 5-9, 14 and 15 is/are allowed.
- 6) ☒ Claim(s) 1-4 and 10-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

***Response to Amendment***

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4, 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Loeffler et al. (US 6,154,701) in view of Yamaguchi et al. (U.S. 20020062183).

Loeffler et al (701) discloses a method and device for controlling the drive train of motor vehicle. The drive train, according to Loeffler et al, includes an engine (101) and a transmission (106). According to Loeffler et al, as set forth in columns 2 and 3, a set of operating region for the transmission (i.e., an output operating region and an input operating) is defined or pregiven. Furthermore, according to Loeffler et al, there is provided, for points of operation within the output operating region of interest, determining preferred operating points within the input operating region. Loeffler et al further disclose defining an operating space for the powertrain in transmission input speed, transmission input torque, transmission output speed and transmission output torque. See column 4. However, while Loeffler et al discloses determining the preferred operating points while considering several criteria (e.g., total efficiency of the drive train of the vehicle), Loeffler et al does not particularly teach that the preferred operating points within the input region are determined as a function of preselected losses within

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the powertrain. Yamaguchi et al, on the other hand, discloses a control system for hybrid vehicle having a hybrid powertrain including an electric motor (103) and a battery (112). The vehicle powertrain system also includes an engine (101) and a transmission (104). See, for example, figure 28. Yamaguchi et al discloses determining operating points as a function of preselected losses within the powertrain. See pages 6, 12, 13 and 14. Yamaguchi et al also discloses determining at least one operating region for a region within the operating space corresponding to system operation as zero battery power. See figures 3-4 and 12-13. See also figures 34-38, page 12. The preselected losses (considered as minimizing an aggregate system loss), according to Yamaguchi et al, are selected from the group consisting of engine losses, transmission losses, motor losses and battery losses and combinations thereof. See pages 13 and 14. Thus, it would have been obvious to one skilled in the art at the time of the invention to be motivated to modify the drivetrain control of Loeffler et al by incorporating the features from the control system for hybrid vehicle of Yamaguchi et al because such modification, as suggested by Yamaguchi et al (page 1) would improve the efficiency of the system.

***Allowable Subject Matter***

Claims 5-9, 14-15 are allowed.

The prior art fails to disclose a method for determining preferred input operating points for a hybrid powertrain system including an electrically variable transmission having an input coupled to an engine, an output, an electric motor and an electric battery

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comprising determining at least one operating region in  $N_i$ ,  $N_o$ ,  $T_o$  corresponding to minimum aggregate system power losses wherein  $N_i$  within the predetermined operating region represents preferred input operating points wherein determining at least one operating region in  $N_i$ ,  $N_o$ ,  $T_o$  is performed for the entire operating space and for a region within the operating space corresponding to system operation at zero battery power, wherein a pair of operating regions in  $N_i$ ,  $N_o$ ,  $T_o$  corresponding to unconstrained and fully constrained battery power is determined. Also, the prior art do not particularly teach, in combination with the other features, determining a first set of preferred operating points corresponding to unconstrained battery usage and second set of preferred operating points corresponding to fully constrained used. The prior art also fails to teach mapping valid combinations of input operating points within the input operating region and output operating points within the operating region to a measure of powertrain system losses as the valid combinations and, for operating points within the operating region, selecting input operating points within the input operating region from mapped valid combinations corresponding to predetermined criteria.

### ***Response to Arguments***

Applicant's arguments filed 12/01/05 have been fully considered but they are not persuasive.

### **REMARKS**

In response to Applicant's representative arguments filed on 12/1/05, Applicant's representative argues on page 9 of response that the prior art Loeffler et al. do not

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teach minimizing an aggregate system loss in determining preferred operating points within the input operating region. However, the office action points that the Yamaguchi et al. prior art discloses determining operating points as a function of preselected losses (minimizing aggregate losses) within the powertrain. See pages 6, 12, 13, 14. Besides, in Applicant's response, on page 11, Applicant acknowledge that one skilled in the art recognizes that a maximum total drivetrain efficiency term ( $\eta_{GTA}$ ) corresponds to a minimum aggregate system loss. Applicant's representative argues that Loeffler et al. and Yamaguchi et al. alone or in combination, do not teach determining at least one operating region in transmission input speed ( $N_i$ ), output speed ( $N_o$ ) and output torque ( $T_o$ ) corresponding to minimum aggregate system power losses wherein  $N_i$  within said determined operating region represents preferred input operating points. However, in the office action it is pointed that the supplement limitations are taught by Yamaguchi et al. see pages 13, 14, figures 3-4, 12-13. Applicant's representative further argues on page 10 that Yamaguchi merely teaches establishing the ratio of the fuel consumption rate of a power apparatus (e.g. engine or fuel cell) required to generate an amount of power equal to the required power to drive the vehicle to the power required to drive the vehicle. However, the remained rejected claims do not recite any limitations pertaining to establishing the ratio of fuel consumption. The rejection for claims 1-4, 10-13 is therefore maintained.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gertrude Arthur-Jeanglaude whose telephone number is (571) 272-6954. The examiner can normally be reached on Monday-Friday from 8:30 a.m. to 6:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Black can be reached on (571) 272-6956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

GAJ

*GAS*

December 14, 2005

*Gertrude A. Jeanglaude*  
GERTRUDE A. JEANGLAUE  
PRIMARY EXAMINER